WE CLAIM:

1. A composite, comprising:

a substrate;

a pillar formed on the substrate at a selected location comprising an insulating, semiconducting or conducting material; and

a nanoscale structure formed on the pillar.

2. The composite according to claim 1 where the nanoscale structure comprises a nanotube.

3. The composite according to claim 1 where the pillar comprises a semiconducting material.

4. The composite according to claim 1 where the pillar comprises a metal selected from the group consisting of W, Pt, Au, Al, Fe, Ni, Ti, Ta, Cu, and combinations thereof.

5. The composite according to claim 1 where the pillar is electrically connected to an electronic device.

6. The composite according to claim 2 further comprising a catalyst for nanotube synthesis.

7. The composite according to claim 1 where the substrate is silicon, and the pillar is platinum.

8. The composite according to claim 2 where the nanotube is a carbon nanotube.

9. The composite according to claim 1 where the composite forms a field emitter device where the pillar comprises a tungsten tip and a nanotube is formed on the tip.

10. The composite according to claim 9 where the device has a single field emitter.

11. The composite according to claim 1 where the composite forms a device having at least two terminals.

12. The composite according to claim 11 where the composite forms a transistor.

13. The composite according to claim 12 where the nanoscale structure is a nanotube having a diameter of from about 1 to about 10 nm.

14. The composite according to claim 10 where the nanoscale structure is a nanotube having a diameter of from about 10 to about 1000 nm.

15. The composite according to claim 8 where the nanotube has a diameter of from about 1 to about 200 nm.

16. The composite according to claim 8 where the nanotube has a diameter of from about 1 to about 100 nm.

17. The composite according to claim 1 where the substrate includes at least one of a metal, ceramic, plastic or a semiconductor.

18. The composite according to claim 1 where the substrate includes at least one of silicon, silicon nitride, quartz and mica.

19. The composite according to claim 1 where the nanoscale structure comprises at least one of carbon, zinc oxide, cadmium sulfide and silicon dioxide.

20. The composite according to claim 19 where the nanoscale structure is a ZnO nanowire.

21. The composite according to claim 20 where the ZnO nanowire functions as a field emitter.

22. The composite according to claim 1, further comprising
plural pillars arranged on the substrate in a selected pattern; and
plural nanoscale structures formed on the pillars.

23. The composite according to claim 22 where each pillar is associated with one pixel in a flat panel display.

24. The composite according to claim 23 where a single carbon nanotube is formed on each pillar.

25. The composite according to claim 23 where a single ZnO nanowire is formed on each pillar.

26. The composite according to claim 22 where at least one pillar forms an electrical connection to a circuit formed on the substrate.

27. The composite according to claim 22 where the pillars have a width of from about 10 nm to about 1 μm.

28. The composite according to claim 22 where the plural nanoscale structures form a field emitter device.

29. The composite according to claim 24 where the nanotubes have a diameter of from about 1 to about 1 μm.

30. A method for synthesizing a nanotube in a defined location, comprising:

providing a substrate;

depositing a catalytic material in a defined location on the substrate; and

synthesizing a nanoscale structure using the catalytic material.

31. The method according to claim 30 where providing a substrate comprises forming metal pillars in defined locations on the substrate.

32. The method according to claim 31 where the metal is selected from the group consisting of W, Pt, Au, Al, Fe, Ni, Ti, Ta, Cu, and combinations thereof.

33. The method according to claim 31 where the metal is Pt

34. The method according to claim 30 where the catalytic material comprises Ag, Au, Cu, Co, Fe, Mo, Ni, Pt, Ti, Mg, Y, Zn alloys thereof, and combinations thereof.

35. The method according to claim 30 where the nanoscale structure comprises a nanotube.

36. The method according to claim 35 where the nanotube is a single-walled nanotube.

37. The method according to claim 36 where the nanotube has a diameter of from about 1 to about 10 nm.

38. The method according to claim 35 where the nanotube is a double-walled nanotube.

39. The method according to claim 38 where the nanotube has a diameter of from about 1.5 to about 20 nm.

40. The method according to claim 35 where the nanotube is a multi-walled nanotube.

41. The method according to claim 40 where the nanotube has a diameter of from about 8 nm to about 1 μm.

42. The method according to claim 30 where the catalytic material is patterned by focused ion beam.

43. The method according to claim 35 where synthesizing the nanotube comprises chemical vapor deposition.

44. The method according to claim 43 where chemical vapor deposition includes using a carbon source and hydrogen in about a 1 to 13 volume ratio.

45. The method according to claim 31 where the pillar has a width of from about 10 nm to about 5 μm.

46. The method according to claim 30 where the catalytic material comprises at least one of Ag, Au and Pt and where the nanoscale structure is a zinc oxide nanowire.

47. The method according to claim 30 where the catalytic material comprises at least one of Ag, Au and Pt and where the nanoscale structure is a silicon oxide nanowire.

48. The method according to claim 30 where the catalytic material comprises at least one of Ag, Au and Pt and where the nanoscale structure is a tungsten or tungsten oxide nanowire.

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